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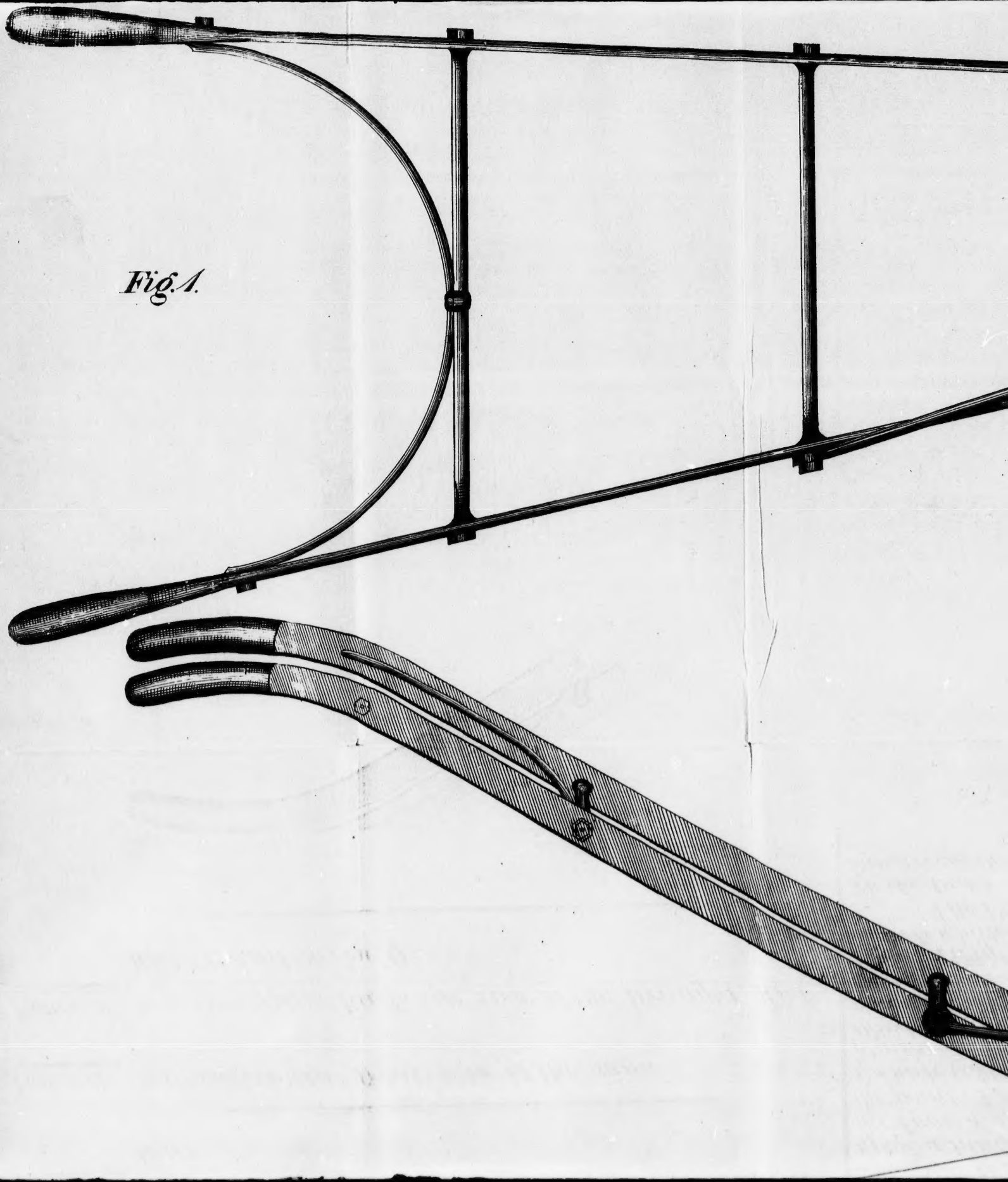
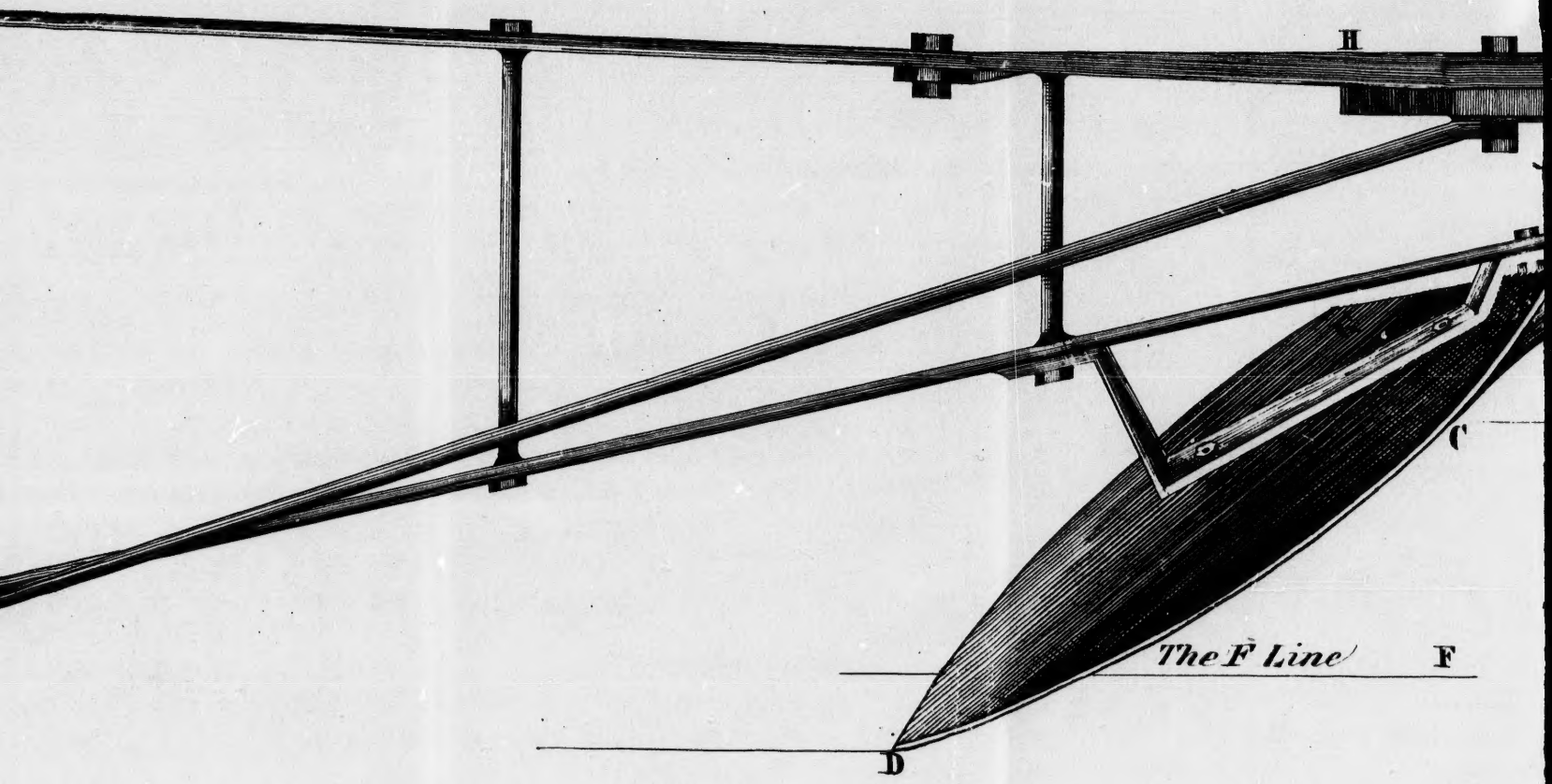


Fig. 1.



Scale 48 Inches to a Foot.

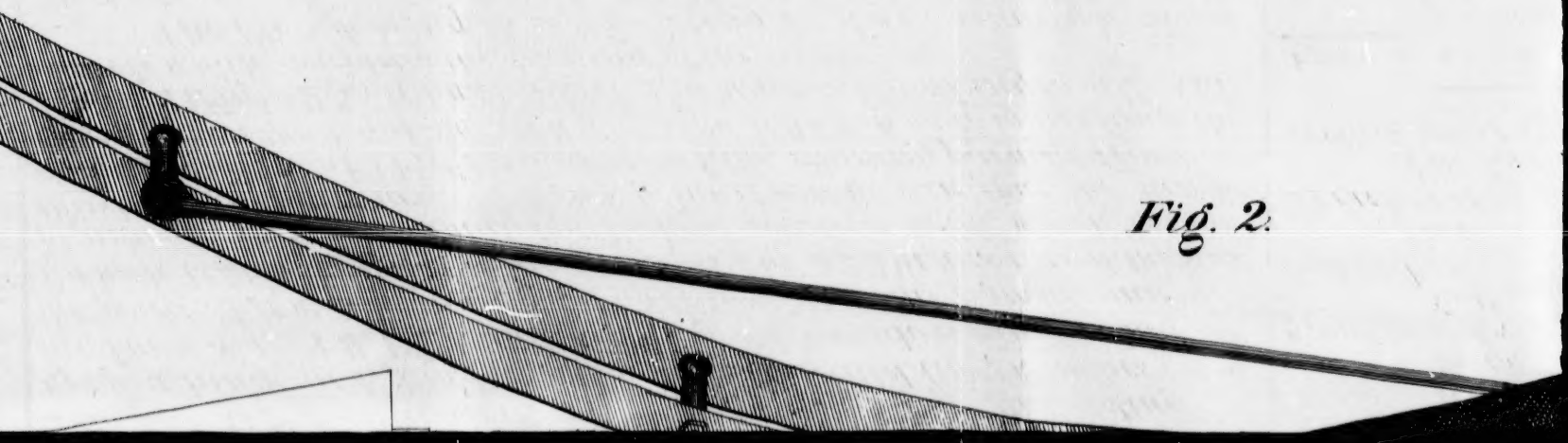
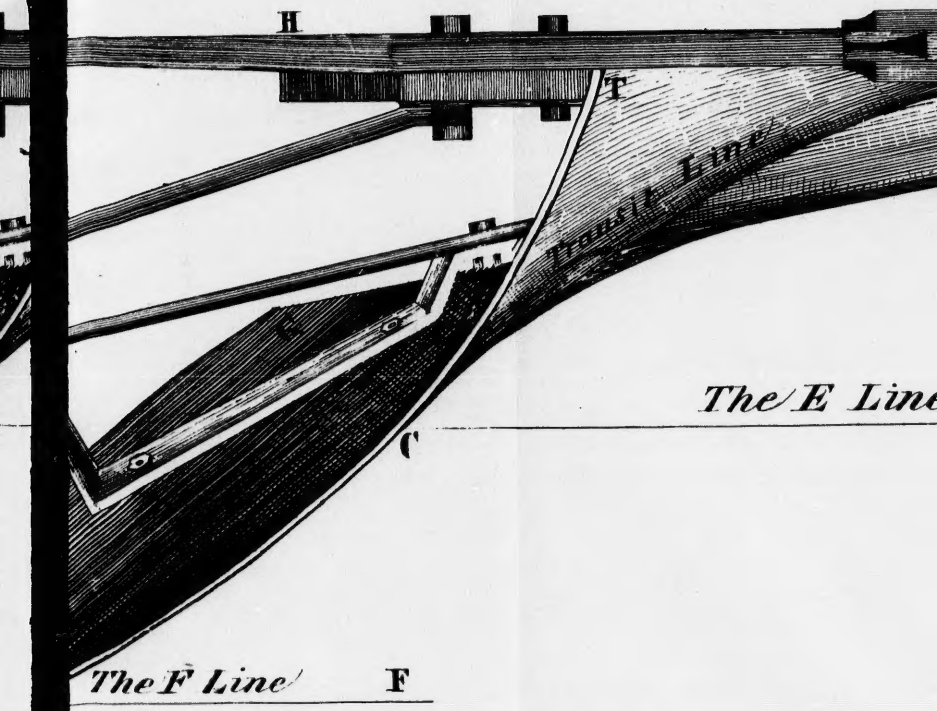


Fig. 2.



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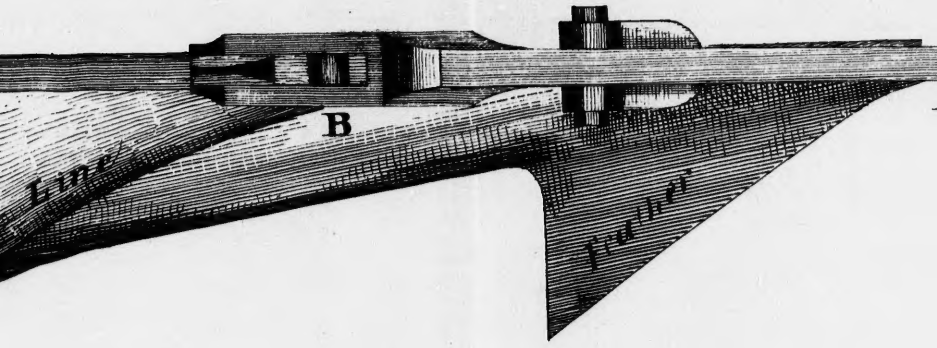
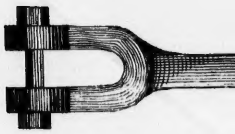
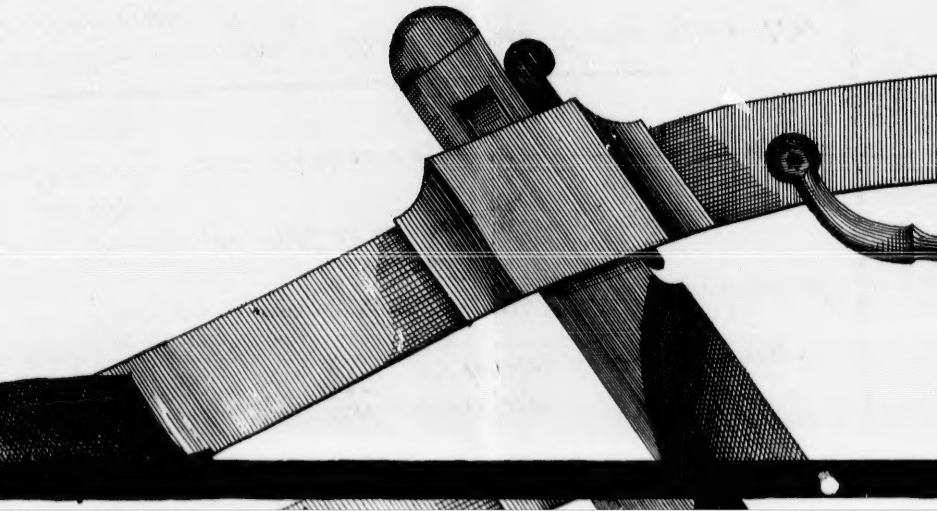


The E Line





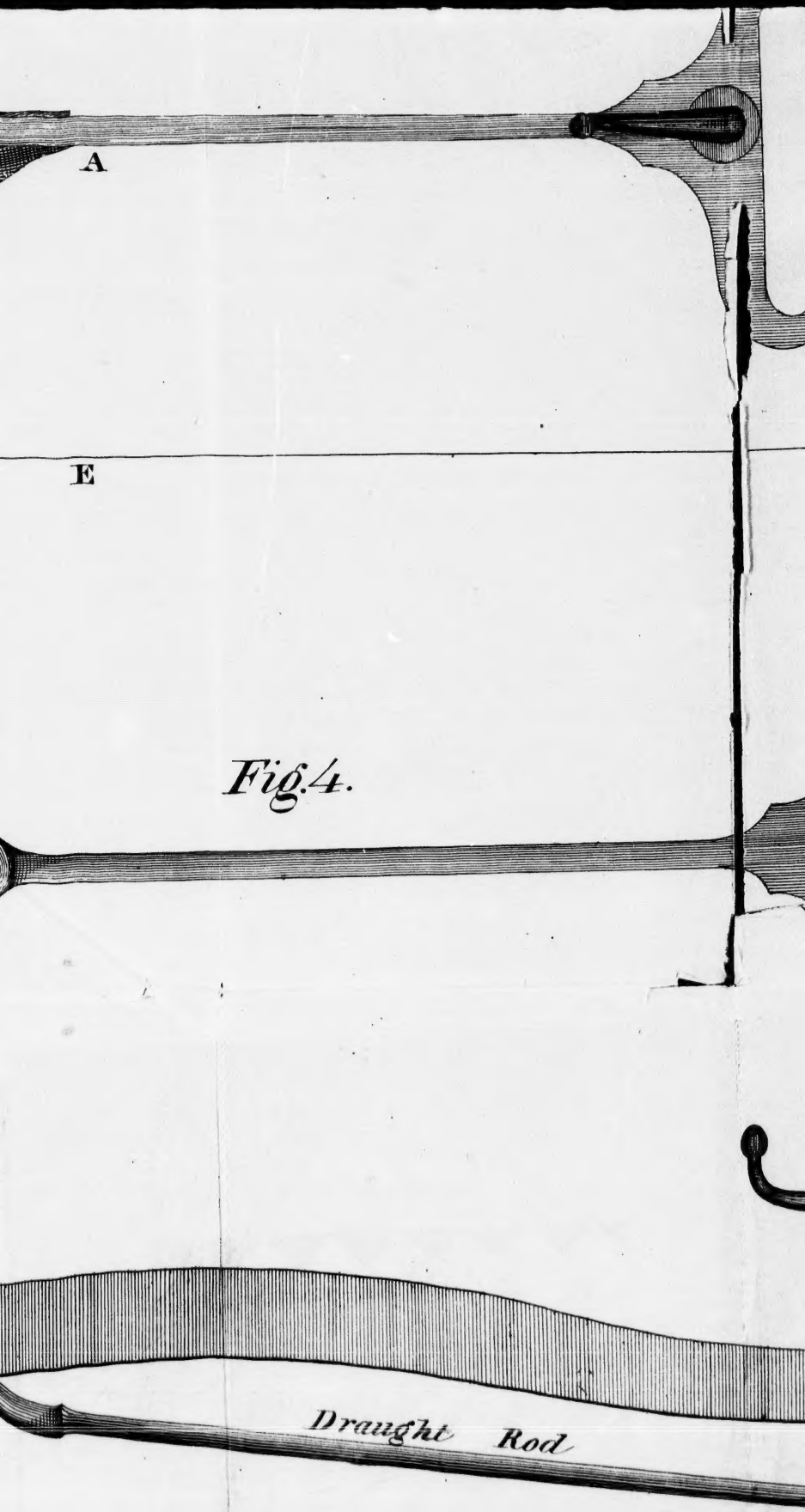

A
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Fig. 4.
Draught Rod

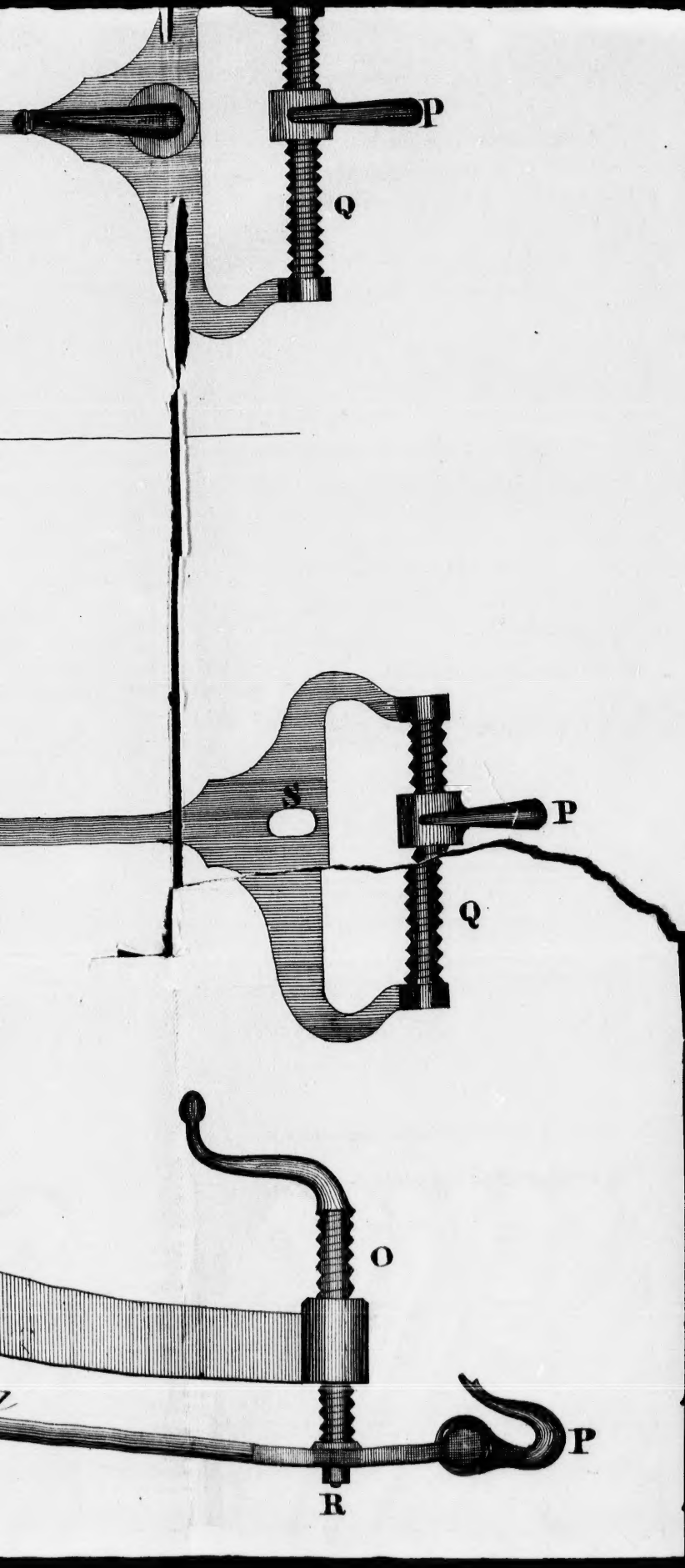
P
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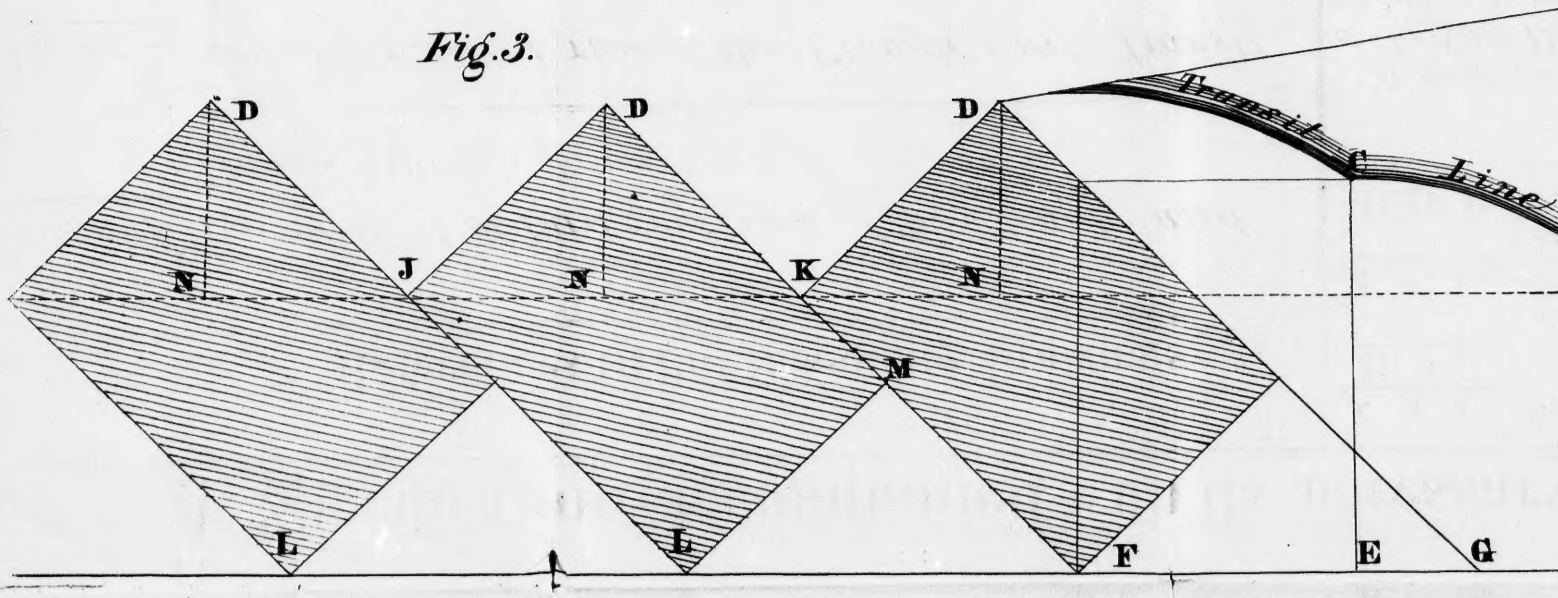
Fig. 3.



A. Specification (accompanied with the necessary

References to the foregoing Drawings.

Figure 1. *Is a vertical or Bird's eye view of the Plough and Transit Line.*

Figure 2. *Is a horizontal view of the Plough and Transit Line.*

Figure 3. *Is a horizontal front view of the same.*

Figure 4. *Is a vertical or Bird's eye view of the Draught Rod Hook P. and Screw Q.*

A. A. A.
B. B. B.
C. C. C.
D. D. D.

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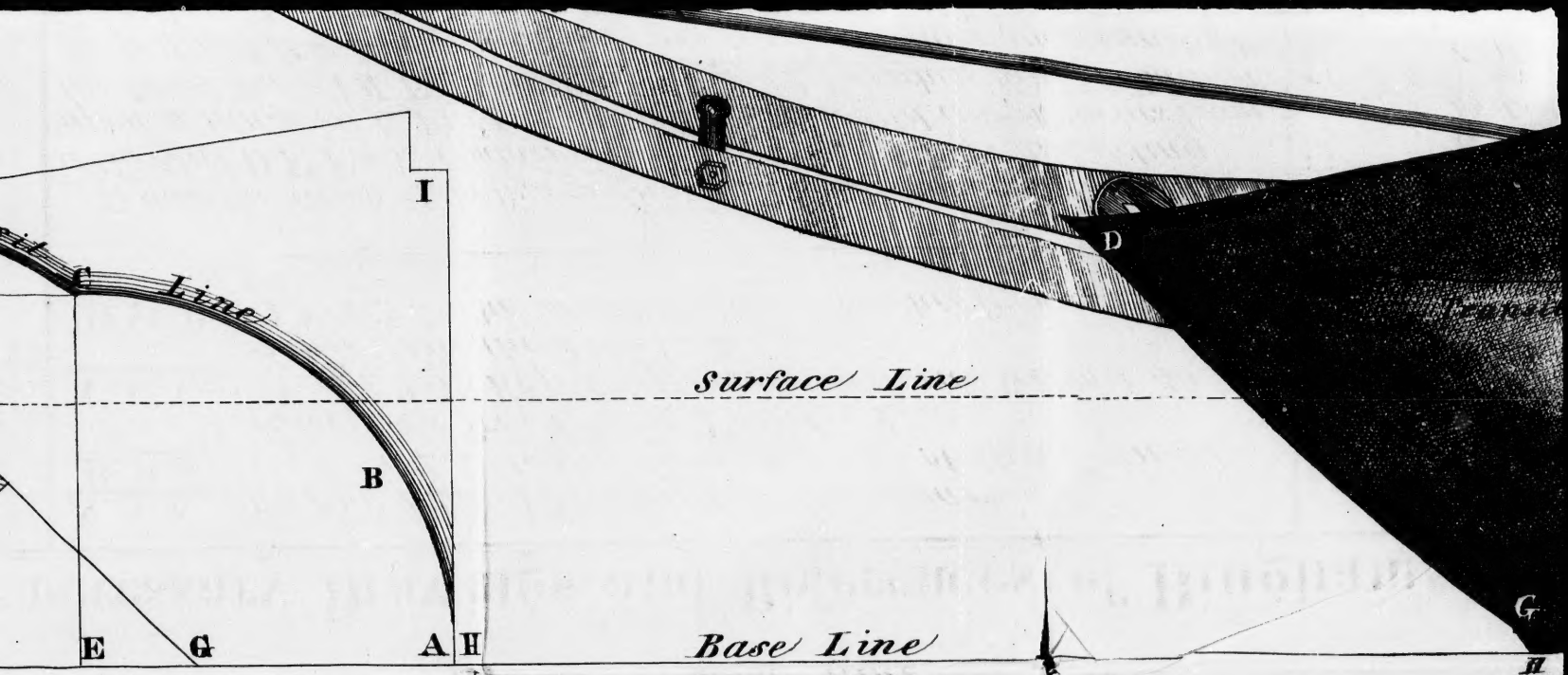

e necessary Drawings and References) of Bingham's Plo

A.A.A. in Fig^s 1.2.3. The Point of the Share.

B.B.B. " 1.2.3. to the first Section of the Transit 15 inches from the Point A.

C.C.C. N°s 1.2.3. Represent the second Section 30 inches from the Point A.

D.D.D. N°s 1.2.3. The third Section 45 inches from A.

To shew the action of the furrow Slice upon the Plough take the end view of the Slice D.F. Fig.3: commencing at the point A. Fig.1 and acting upon a hinge at E, Fig^s 1 or 3. which is a parallel line 10 inches from the Land Side A.H. Fig.1: and at B Fig^s 1.2.3. which is 15 inches back of the point A it will be seen that it has raised the Slice 5 inches and at C which is 30 inches back of the point A (Fig^s 1.2.3.) it has raised the Slice 10 inches from a horizontal to a Vertical position or 90^e which is two thirds of the Curvature. At this point it will be seen that the hinge changes from E to F (Fig^s 1 or 3) another Line running parallel 17 inches distant from the Land Side A.H. (Fig.1) and at D which is 45 inches from the Point A (Fig^s 1.2.3.) it has turned the other 45° making in all 135 degrees which completes the turning of the Slice.

The Plough being 45 inches in length, it will readily be seen is 3^c to the Inch. The point D being 19 inches from the Land side and 12 inches from the Base, as will be seen in Fig. 3.

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Figure 3. Is an
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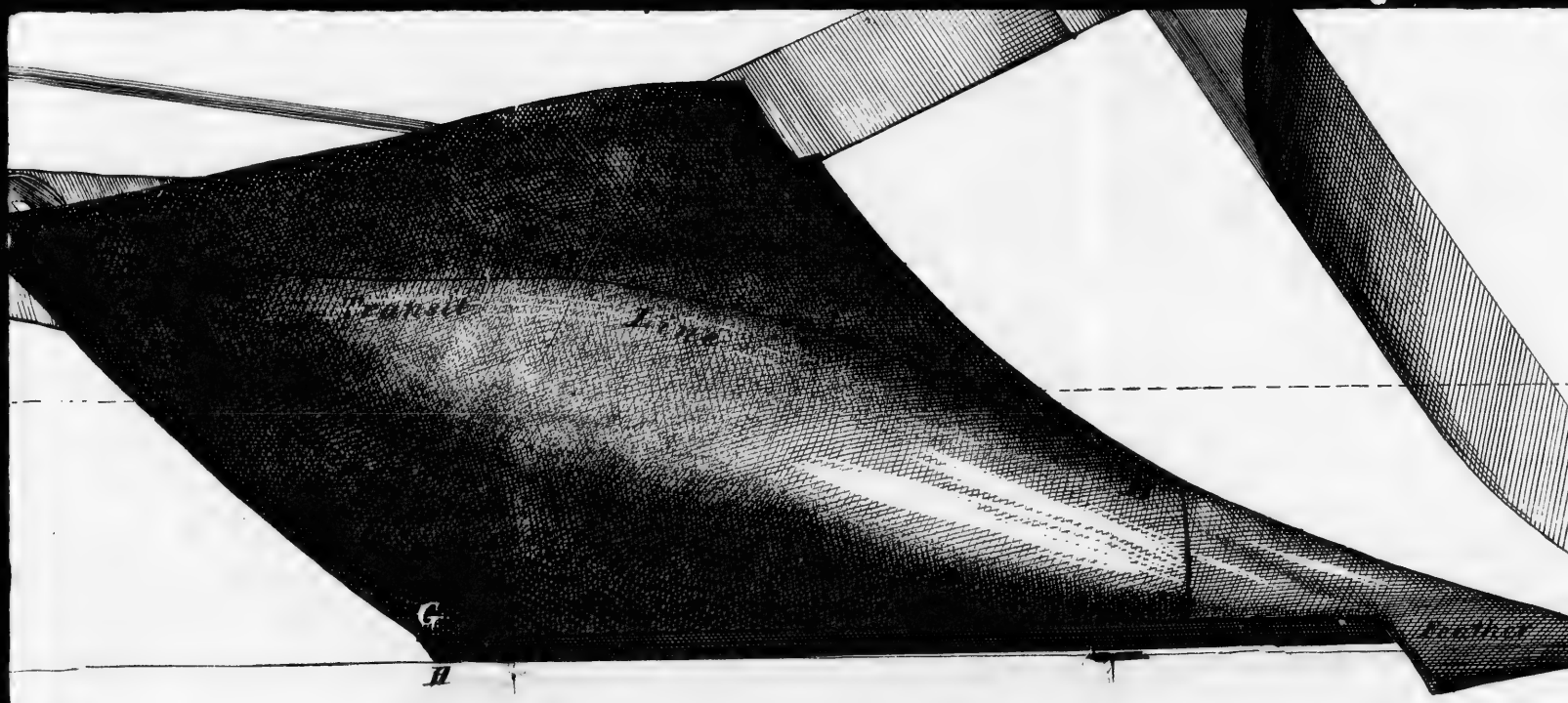

Bingham's Plough, explaining the improvements and

Now following the Line D.G. (Fig. 3.) from G to A is 7 inches which will give the breadth of the heel G.H. Fig. 1 which is sufficient to clean the bottom of the Furrow; so that the next slice can be turned up without obstruction. Wider than this would cause unnecessary friction.

Figure 3. Is an example of a Rectangular Slice 10 by 7 inches.

D.I.G.A. may be taken as a transverse section of the body of the Plough. D.G. being the terminal line of the mould board. D.F. a section of the slice which is just being laid up.

D.L. representing the slices previously laid up.

In the Triangle J.D.K. the Base J.K is 10 inches being always equal to the breadth of the slice.

K.M. is the lap of one furrow upon another; which in all cases will be 3 inches.

From J to D is 7 inches. From D to K is also 7 inches; making 14 inches of atmospheric surface.

The Vertical lines D and N are 5 inches; which is the highest surface that can be obtained.

Figure 4. S. is an oblong hole to free the sine of the vertical Screw upon the arc made by the Draught Rod.

Q Fig.s 1 or 4 is the horizontal screw which the hook P revolves upon. By giving it one revolution it will gain one

Maclear & Co. Lith. Toronto.

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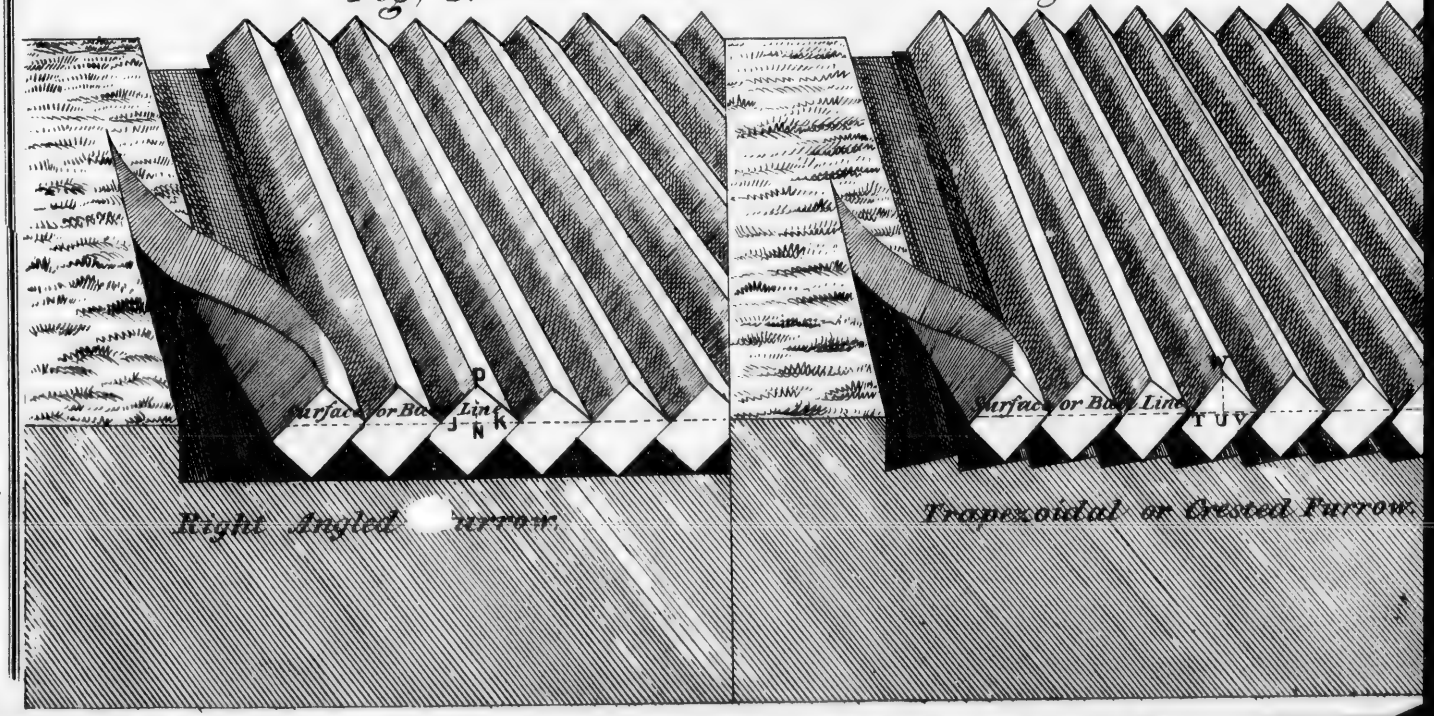
O in Fig. 2 is a vertical Screw passing through a point in the beam to elevate or depress the draught rod and hook P which can be done to a point, giving greater or less depth as may be required.

Fig. 5.

Fig 6.



Right Angled Furrow

Trapezoidal or Crested Furrow

ESSA

OF NORWI

VES

A PRACTICAL

ESSAY ON THE PLOUGH,

BY

JACOB BINGHAM,

OF NORWICH, COUNTY OF OXFORD, PROVINCE OF CANADA
WEST, PATENTEE OF THE IMPROVED PLOUGH,
CALLED "BINGHAM'S PLOUGH."

TORONTO:
MACLEAR & CO., 16, KING STREET EAST.

1856.

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TORONTO:

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ESSAY ON THE PLOUGH.

The object of the writer in preparing this pamphlet is, to present within a moderate compass, a general introduction to the plough, and to ploughing, founded on accurate principles. In doing so, he would call to mind the anecdote told by Dr. Franklin, when certain members of the American Congress were picking flaws in the Declaration of Independence, how a party from the country were once criticizing a hatter's sign, having on it the picture of a hat, and under the hat the words printed: "*Hats sold here for cash, by John Smith.*" One said, the sign itself showed that *hats* were meant and nothing else; another that the word *sold* was useless, because it would clearly be inferred that they were not *to be given* away; a third was for striking out the word *here*, as the place of sale would naturally be presumed to be where the sign was; a fourth said, all would know that when the hats were sold the money would have to be paid; a fifth insisted that the *name* of the seller was entirely superfluous; and by these repeated criticisms all the words were erased from the sign, and nothing left but the picture of the hat.

While therefore we would be cautious that we do not use a redundancy of language, we would be equally cautious not to strike out words in our own peculiar way of expression too freely, because what might seem superfluous to many readers, may be acceptable, or useful, or even needful, to many others.

Under these circumstances, the writer has resolved to lay before the public in as plain and intelligible language as he is capable, not only the rules and practices peculiar to each branch of the plough, and the business of ploughing, but in an especial manner the facts, principles and maxims on which those rules and practices have been established. Care has been bestowed, in the use of every word or expression, of which, the meaning might not be obvious to the generality of readers, to use explanatory and familiar language. Dictionaries of arts and sciences are not always at command; nor are we, at all times disposed to interrupt our course of reading

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for the purpose of consulting them. The author has considered it advisable to use language that will not require a resort to dictionaries of art and science, as being a method more likely to be generally useful. The scientific and learned reader can of course stoop to the comprehension of familiar expressions, while those who have not been favoured with a knowledge of scientific terms, would be at a loss to understand them without further enquiry. Thus, while the unlearned will clearly comprehend the whole treatise, the scientific scholar, with an appreciative smile, will pass along with the familiar and homely style of the author.

The reader, whatever may be his station or his acquirements, is respectfully regarded, as not only willing, but desirous and able to learn: and on this consideration pains have been taken, not merely to tell him what he is to do, but why he is to do it; he has not only the practice but the origin and principles of each branch laid before him.

The present age is perhaps the most remarkable that time has produced, for the approaches to perfection of almost every kind of machine or tool required in the various departments of art and manufacture; our present subject is of course confined to agriculture, and we proceed to remark, that, in a new country, and among new settlers, many difficulties beset the agriculturist, subjecting them to methods more or less peculiar, cheap and superficial, and to greater changes than are experienced in old and long settled countries.

Among the peculiarities incident to the new and crude condition of things in our country, is the wide and shallow ploughing heretofore practised, and which even now is practised by many. The early settlers were compelled by necessity to secure present profits, and were obliged to adopt the quickest and cheapest manner of ploughing and preparing the ground for the reception of seed. They had to contend with many obstructions in the tillage of a rough and uneven surface, and they used ploughs with very short mould boards, of abrupt curvatures and carriyng shallow and wide furrows. In the progress of things these difficulties have been, to a considerable extent, modified or removed.

The plough is the subject of the present treatise. The plough, standing as it does at the head of all agricultural implements, it affords a most important and interesting subject for consideration. Our daily bread, as it is divinely bestowed upon us, comes to us through its instrumentality. Its use in modern tillage is indispensable. The plough, or some rude

resemblance of it, to break up the soil, must be coeval with the earliest beginnings of tillage; and a treatise upon its history, and upon the principles and reasons on which its improvements have been effected, must be at once both highly interesting and instructive. The plough of modern times has been exhibited and used in a variety of forms. Various causes have existed to prevent its improvement and to retard its approximation to perfection not necessary here to enumerate.

In all ancient figures and descriptions of the plough, its extreme simplicity is to be remarked, but with the progress of time and human skill are to be observed deviations from its early simplicity and an increase in the number of its parts. The Roman ploughs, as they are described by different writers, are of very remote origin, and they are used at the present time in some portions of the outer Hebrides and in Syke. They exhibit a very curious relic of the ancient celtic modes of cultivation. This ancient plough is formed of one piece of wood, selected from its possessing a natural bend, so that the sole presents nearly a horizontal position, when the handle is placed upon the shoulder of the person who uses the implement. A simple wedge shape share is fitted on the fore part of the sole by means of a socket. A wooden peg is inserted in the side of the heel which completes the implement. On this peg the foot of the operator is applied, to push the instrument into the ground. This implement is directed by the hand alone, and makes simply a rut in the ground, and in this ancient and imperfect implement are to be traced the rudiments of the plough.

As the cultivation of the soil became more and more an object of industry, corresponding improvements in the plough and other agricultural implements, naturally followed: but in England, previous to the beginning of last century, the plough appears to have continued in a very uncouth state. About that period agriculture seems to have become more an object of improvement. The effects of draining began to be appreciated, and the best modes of accomplishing it began to be studied. Still further improvement of the plough was the consequence: accordingly we find an improved plough introduced into the northern counties of England, under the name of the Dutch or Rotherham plough. This appears to be the foundation of all the modern improvements upon the plough, and from the circumstance of engineers and mechanics having been brought from Holland to drain the English fens, there is reason to conclude that the Rotherham plough was originally an importation from Holland.

About the middle of the past century the Rotherham plough appears to have been partially introduced into Scotland. Mr. James Small afterwards took up the subject, and by his judicious improvements, gave a decided character to the plough. It appears that Small was the first who gave the mould board and share a form that could be imitated, and by following his directions mould boards might be multiplied and modified, to suit different views of amendment, still preserving the general form. When Small introduced his method of construction mould boards were really boards of wood, covered for defence with plates of iron; and being necessarily made by many different hands, a failure in practice was often the necessary consequence. The founding of cast iron was becoming general, and this favourable circumstance was seized upon, and made tributary to the purposes of the plough. Mould boards, together with the sheath or head, the sole and land side plates, were made of cast iron; and a model or pattern of these parts, having been once formed, any number of castings could be obtained, each being in point of form as perfect as the original model. The plough was thus in a great measure placed beyond the power of uninformed and careless mechanics to maltreat, came rapidly and deservedly into public esteem, under the name of "*Small's plough.*" Other writers about the same time published methods of constructing mould boards, or juster principles. Among these, the method proposed by Bailey of Cunningham, may be mentioned, as approaching very near the geometrical forms. Others less perfect were proposed, not necessary here to mention; while several have published general descriptions of their construction of the plough but have witheld the principle on which their mould boards were formed.

While these improvements were going on, the framing was universally constructed of wood, but about the beginning of the present century maleable iron began to be employed in their fabrication. The application of this material came with so much propriety, that it is now, in Scotland, almost universal. It has many advantages over the wooden framing, the most prominent of which is its durability under any exposure, and the greater capability it gives the implement to withstand the shocks to which it is often liable in working.

About this period another form of mould board and share was introduced. The mould board heretofore referred to came under the denomination of concave, or more properly straight lined. Mr. Wilkie, of Uddingston, near Glasgow, introduced his new form of mould board with convex lines, which has

been adopted in various districts in Scotland to the exclusion of the concave form.

The above brief sketch of the progress of the plough from its rude state when used by the Romans, to its present excellence of construction, the reflecting reader will draw the proud conclusion, that the march of improvement in agricultural implements, has not been behind any of the other industrial arts or sciences; and he will with the author, be also inspired with the hope that this march is still onward, and that continued efforts will achieve still further improvement.

On entering upon a detailed description of the plough, as laid down by different makers, it will be useful to the agricultural student to be made acquainted with the different parts or members of that implement, which we shall introduce in the following order: the share, mould board, land side, slip or sole shoe, coulter, clevis or bridle, beam, and stilts or handles.

1st. The share is the forward part of the plough, the point of it marked A in the diagram (Figs 1, 2, 3), which first enters the earth with a sharp cutting edge, running horizontal called the feather. The back part forms the neck or socket, and embraces the head or foremost part of the land side, and being in effect a part of the mould board. 2nd. The mould board B C D, (Figs 1, 2, 3), is a curved plate of iron and receives the furrow slice from the share and turns it gradually over, and deposits it continuously at the proper angle. 3rd. The landside, A H, (Figs 1, 2, 3), is that portion of the plough's body which is always in contact with the firm or unploughed land, and to which the share, mould board, beam, left stilt or handle, and slip or sole shoe are attached. 4th. The slip or sole shoe, A H, (Figs 1, 2, 3), is a plate and portion of the landside having upon the lower edge a flange projecting under the land side, and forms a base upon which the plough stands. 5th. The coulter is a blade of iron similar to that of a knife which severs the slice from the unploughed land; its position is forward of the plough's body with its upper end passing through an oblique hole or mortice in the beam to which it is attached, and running at an angle from 55 to 80 degrees until the lower end comes nearly in contact with the point of the share. 6th. The beam is a bar of iron or wood which is bolted to the land side and projecting forward until it comes nearly to the line with the centre or point of resistance on the plough's body to that point upon the horse's collar to which the draft chains are attached, 7th. The clevis or bridle is attached to the forward part of the beam; to this, the team is attached.

The design is to give the plough more or less earth, and also more or less land. 8th. And lastly, The silts or handles are two bars of iron or wood, projecting back and upwards from the plough's body to a sufficient height, that a man can walk erect and hold them in his hands, and use them as levers to guide the plough.

The writer will now proceed to the general description as constructed at the present time, and he will take for the subject of his treatise, the plough that he recently constructed for the benefit of the agriculturist, the same being one of the ploughs which the Government of Canada selected and purchased to represent that noble Province, at the Paris universal exposition of 1855. This plough ranked high at the trial at Trappes, as stated by Mons. Victor Borie in the French *Journal d' Agriculture Practique.* After describing at some length the peculiarities and performances of the French, Belgian, English, and other ploughs, (thirty having been entered for competition) he concludes with the following remarks in reference to Canada: —"The ploughing tests were brought to a close by a trial of two ploughs, equally remarkable; to wit, the plough of Ransom & Sims, (of Suffork, England,) and that of Bingham's, Norwich, (Upper Canada.) The first is entirely of wood and iron, like all the English ploughs, and the results which it produced seemed most satisfactory, but it appeared to require a little more draught than the Howard plough. Bingham's plough very much resembles the English plough; it is very fine and light in its build, the handles are longer than ordinary, which makes the plough much more easy to manage. The opinion of the French labourers and workmen who were there, appeared on the whole very favorable to this plough."

The plough, as it is constructed at the present time, consists of the number of parts hetetofore described, and to which the reader should refer, in order to become fully acquainted with them. How neatly soever these parts may be put together, if they are not all *tempered* as it is termed, to one another, that is, if any part has more to do than its own share of the work, the entire implement will go unsteadily. It can easily be ascertained whether a plough works steadily or not, and the fact is thus practically ascertained, and its rationale is as follows:

On taking hold of the plough by the handles with both hands, while the horses are drawing it through the land, if it tends deeper than the slice previously determined on, the remedy for this error is, either to press harder upon the

handles, and by their power as levers, bring the share nearer the surface of the ground; or to effect the same in another way, lower the draught rod, (or bolt, if the common clevice is used,) which will give the plough "less earth;" but should both fail to give ths desired effect, there must be some error in another part of the plough. On examining the sock or share, (if made by the smith,) its point may possible be found to dip too much below the line of the sole, which of itself will create a tendency to go deeper than it should. This error can only be rectified by the smith. Should the plough have the opposite tendency, that is, a tendency to come out of the ground, this tendency cannot well be counteracted by the opposite method of lifting the handles, and at the same time endeavoring to push the plough in the earth. With these efforts you cannot walk steadily, having no support for yourself, but rather giving support to the plough. You should therefore raise the draught rod or bolt, which will give the plough more earth. Should this fail to give the desired effect, you should then examine the sock or share which in all probability will be found to rise above the line of the sole, and must therefore be brought down to its proper level and position by the smith. The share should have an inclination downward, as well as landward, but in either case not exceeding half an inch. Experience confirms this, by giving steadiness of motion to the implement. It is evident, that if a base, the reverse of this was given to it, convex instead of concave, so that the plough should rest on the sole where the share and slip join, it would be found very difficult to manage, if manageable at all. Even a perfectly straight base is found not to give the requisite certainty of action, without a greater amount of exertion as well as closer attention on the part of the ploughman. A like reason prevails for this inclination of the share landwards, as does for its earthward inclination. For the steady motion of the plough, the latter is even more necessary than the former. There is another reason for this landward inclination. The plough is seldom held with its land side truly vertical, but inclining a little landward, and it being desirable to cut the furrow slice as near rectangular as possible, the coulter has always a slight tendency landward at the point; hence it becomes necessary to give the share a like bias. By this arrangement of the parts, the incision made by the coulter, will be nearly vertical, and while it is admitted that these inclinations of the share, afford certain advantages in the action of the plough, it must also be admitted that this practice is liable to abuse.

It has been stated, that if a different arrangement were pursued, a greater degree of exertion and of attention on the part of the ploughman would be required: thus, if the sole and land side of the plough's body were perfectly straight, the plough would present the least possible resistance; but in that case, it would be so delicately adjusted, that the smallest obstacle would tend to throw it out, unless the most unceasing watch should be kept on its movement by the ploughman. To obviate this, he gets the share set with a strong tendency to earth, and if the plough tends to take too deep a furrow, he counteracts this, by lowering the draught with the clevis, until it arrives at an equilibrium, but it is attained at an additional expenditure of horse-power. It is, therefore, the interest of the farmer, to gaurd against giving an undue bias to this important member of the plough. You may find it difficult to make the plough to turn over a furrow slice of the desired breadth. This tendency is changed by moving the draught a little to the right; but in case the fault arises from a spot of hard ground, it may be overcome by leaning the plough a little over to the right, until the obstruction is passed. When the tendency of the plough is the reverse, the draught should be shifted a little to the left, and for a temporary purpose, the plough may be leaned a little over to the left.

These are the ordinary instances of unsteadiness in the working of ploughs; and though they have been narrated singly, two of them may combine to produce the same result. Thus an inclination to run too deep or too shallow, and at the same time taking too broad or too narrow a furrow, the remedy then would be, to overcome the greatest error; but both may be remedied at the same time, by resorting to the means above stated.

Some ploughmen are in the habit of leaning the plough over to the left, the plough thereby cutting less land, than when made to run on the flat of the sole; and to overcome this, the draught is shifted to the right, in order to make the plough cut its proper width. Leaning the plough much to the left is a bad custom, because it makes the lowest edge of the furrow slice, when turned over, thinner than the upper edge, which is exposed to view; thereby inducing the delusion, that the land has all been ploughed of equal depth; and it causes the horses to bear a lighter draught, than when an equal depth of land is ploughed, and the furrow slices having both edges of equal thickness. Old ploughmen are too apt to practice this deceptive mode of ploughing.

The plough should always move flat upon the sole. No ploughman acquires the habit of leaning the plough over to right, because it is not so easily held in that position as when it moves flatly and evenly on the sole.

Some ploughmen acquire the habit of leaning hard upon the handles. This practice tends to lifting up the plough; and in order to keep the plough in the ground, they are obliged to raise the draught farther from the ground than it should be. A little leaning of the hands upon the handles, is at all times requisite, in order to retain a firm hold of them, and thereby give a proper guidance to the plough. A good ploughman will resort to none of these faulty practices above mentioned.

A good plougman will temper the irons, so that there shall be no tendency on the part of the plough, to go too deep or too shallow, or cut too wide or too narrow, a furrrow slice; or cause more draught for the horses or more trouble for himself, than the nature of the work to be performed, requires. The plough, properly tempered, will give ease to the ploughman, and afford him leisure to guide his horses and execute his work in the most satisfactory and creditable manner. Until the ploughman, by attention and experience, learns this art, the best constructed plough will be comparatively worthless in his hands. These remarks are made upon the supposition, that the plough spoken of, is of the best construction, and may, therefore, be tempered to work in the most satisfactory manner. But it often happens, that ill-constructed ploughs fall into the possession of farmers, so that the best tempering the irons are capable of receiving, will never make the plough do good work.

When we take into consideration all the particulars which should be attended to by the skilful ploughman in the proper exercise of his business; to keep the irons in a proper state of repair, to temper and adjust them according to the kind of ploughing to be executed, to guide the horses in a proper manner, and in a word, to make all suitable adjustments to each varying occasion, we may cease to be surprised that there are so few first-rate ploughmen. Good ploughmanship requires greater powers of observation, than most ploughmen possess, and greater judgment than the most of them will take time to exercise, in order to become familiarized with all the particulars relative to ploughing, and to use them to the best advantage.

To be accomplished in ploughing, implies the possession of talent, of no mean order. The ship has been aptly compared

to the plough, and the phrase "ploughing the deep," is as familiar to us as ploughing the land. To be able to put the ship in "*proper trim*," is the perfection aimed at by every seaman, so in like manner, to "*temper the plough*," is the great aim of every good ploughmen.

Many ploughmen in tempering the plough irons, adopt a position of the coulter that increases the draught of the plough. To continue our comparison of the ship with the plough, we will assert, that as the helm is to the ship, so is the coulter to the plough. There is no member of the plough on which such a variety of opinion exists as to its position. One man contends, that the land side face of the coulter, should invariably be parallel (in the horizontal direction,) to the plane of the land side of the plough's body; another would contend for an opinion nearly opposite, that is, the furrow side to range in the same position. But the writer would lay down as a standard, that when the draught is leading the centre of the beam, the cutting edge of the coulter should be in that position, as not to cause the plough to deviate from the width of furrow slice previously determined on, and in all cases at the height of six or seven inches, according to the depth of furrow to which the plough is adapted. The land side of the coulter should be one-fourth of an inch to landward, or to the left of the plane of the land side of the plough's body, in order to clear the unploughed land from the breast of the plough. The office which the coulter has to perform, is simple and uniform, being merely to sever the furrow slice from the unploughed land, to give an equal breadth to the furrow slice, and an unbroken face for the land side of the plough to move against in its continued progress.

In early works on the principles of the plough, some misconceptions have been formed and advanced of the influence of the coulter. The supposition was, that the coulter extending some three inches in front of the point of the share, acted beneficially by giving the coulter a greater rake, and a lower angle with the base; and by these means, causing it to cut the soil to more advantage, and with less resistance. From a series of experiments it has been found, that this supposition is erroneous; and that the projection of the coulter before the share increases the resistance in a very sensible degree. The resistance seems not to be affected by the angle at which the coulter stands. The ordinary use of a common cutting instrument, does not resemble the action of the coulter in ploughing. We make a razor or a knite pass through the object to be cut,

by drawing their cutting edges across the object in the manner we use a saw, which greatly increases the effect, without increasing the force; but let the edge of a cutting instrument be placed simply at an angle with the direction in which the stroke or cut is to be made, and in making the cut, let this oblique position be retained, so that the cutting edge shall proceed parallel with its original position, without any tendency to *drawing* the edge across the direction of the cut, and no saving of force is obtained. This process must be familiar to every one who uses a knife for any cutting purposes whatever. In slicing a loaf of bread, the operator is at once sensible, that by moving the knife gently backward or forward, he is required to exert less force; while at the same time, he makes a smoother cut, than he would do by forcing the knife through the loaf with its edge either at right angles, or obliquely to the direction in which the knife proceeds. The coulter acts in this last position. Its cutting edge stands obliquely to the direction of motion, but has no means of drawing or sliding to cross the forward motion. It therefore cuts by shear force of pressure. Where elastic substances occur, an instrument cutting in this manner, has some advantage in certain cases, as in the case of fibrous roots, crossing the path of the coulter. The latter by passing under them, sets their elastic clusters in motion, by which the edge of the coulter is allowed to slide under them to a small extent, and this produces to a small extent the sawing motion. In the non-elastic earth, of which soils are chiefly composed, nothing of this kind can occur; hence the angle of the coulter as it affects the force requisite to move the plough, is of little importance; yet the angle of the coulter is capable of producing, practically, important effects in other cases.

In ploughing stubble land, or land that is very foul with weeds, the coulter should be set at a long rake; that is, set at a low angle; say from 45 to 55 (degrees) which will give it a tendency to free itself of the roots and weeds, that will collect upon it by their sliding upwards on the edge of the coulter. This foul matter will generally free itself of the coulter without exertion on the part of the ploughman. The accumulation of masses of such refuse matter on the coulter, greatly increases the labour of the horses.

It has been ascertained by the dynamometer, (an instrument for testing the draught of ploughs, &c.,) that the accumulation of such matter on the coulter, has increased the draught of a plough of 26 stone to 36 stone; and immediately on the

removal of this obstruction, the plough fell back to its original draught of 26 stone. It is hardly necessary to add that the prevention of such waste of muscular exertion ought to be the care of the Farmer, as far as excellence of construction in the implement he may use, and the carefully keeping that implement free and clear from all clog and obstruction, will admit of such prevention of waste labour.

To apply a plough into the sod with its coulter set in the position above described would produce a kind of proughing, very objectionable. A coulter set in this way would cause the partially matted surface to present a ragged edge, from the coulter acting upon the elastic fibres and roots of the grass pressing them upwards before they could be cut through. The ragged edge of the slice thus produced, gives, when turned over, that untidy appearance which is often seen in sod ploughing. To obviate this the coulter should be set at a higher angle, by which means it will cut the mat without bearing it up with a barbed edge. Good ploughmen when they are about to exhibit a specimen of fine ploughing, are so guarded against this object, that they sometimes get their coulter kneed forward under the beam, so far as to bring the edge nearly perpendicular, and thereby removing the sliding tendency of the fibres and roots upon the coulter, and also giving a tidy appearance to the furrow slice; we have seen, however, that the coulter performs but a comparatively small part of the operation required in the turning the furrow slice.

The share takes a more important part in the process, and upon that part of the implement much depend upon the character of the plough. The operation of the share may be described as follows:—By the insertion of its point under the slice to be raised, and this is followed up by the feather which continues the operation, by separating the slice horizontally from the subsoil or sole of the furrow, and at the same time the coulter separates the slice vertically from the still solid or unploughed ground; but as the action of the share is continuous, its form must be modified to suit a continuous action; hence, instead of a broad cutting edge, similar to that of a spade, which, in the generality of soils would be liable to be thrown out of its course by obstacles, such as tones, &c. The share may be considered as a spade, of which one of its angles has been cut off obliquely, leaving only a narrow point remaining, adapted to make the first impression on the slice, a narrow point being liable to meet obstructions only in the ratio of its breadth to the breadth of the entire share. The chances of encountering

obstructions are thus diminished as far as allowable, and though the oblique edge, now called the feather, has a like number of chances to come into contact with stones, yet from its form taking them obliquely, and the direct resistance upon the body of the plough on the land side prevents any swerving to the left; such stones as come in contact with the sloping edge of the feather are easily pushed aside toward the open furrow on the right.

At the first thought of this operation it might probably occur to the reader that the feather of the share should be of a breadth sufficient to produce the immediate and entire separation of the slice from the subsoil; but experience teaches us that such an arrangement would not fulfil the requisite conditions of good ploughing. The slice must not only be separated, but it must gradually be turned upon its edge, and still farther over until that which was the upper surface becomes the lower lying at an angle of about 45° (degrees). It is found that if the slice were entirely cut off from the subsoil, the plough would frequently fail in turning it over to the position just referred to; it might be only moved a space to the right and fall back, or at most it would be liable to remain standing on its edge; in either case the work would be very imperfectly done, and it has, therefore, been found necessary to leave a portion of the slice uncut by the feather of the share. This portion of the slice is left to be torn asunder from the subsoil as it rises upon the mouldboard, by which means the slice retains longer its hold to the subsoil; turning by that hold, as upon a hinge, until brought to the vertical position, after which, it is brought more easily to its final position as above described. The breadth of the share, or extreme point of the feather should be seven-tenths of the width of the furrow slice; for instance, we are cutting a furrow slice 10 inches by 7 (as all right angled lap furrows should be cut in proportion), the feather should cut the furrow slice from the subsoil seven inches from the land side, or your share should cut the furrow slice from the subsoil equal to the depth of furrow slice you are cutting, so that the succeeding slice should turn up without any obstruction as there would be more or less crumbs adhering to the subsoil where the furrow slice is torn up from it.

The position of the feather comes next under notice, as its having to perform the operation of cutting that portion of the furrow slice from the subsoil that lies between the point of the share and the extremity of the feather. It is formed with a thin edge suited to cutting the soil. The position of that cut-

ting edge forms a principle feature in distinguishing the furrow slices, which are of two kinds. 1st. That which has the cutting edge lying horizontal or at right angles with the cutting edge of the coulter; and 2nd. That which has its cutting edge elevated as it retires from the point of the share making a more acute angle than that of the right angled furrow slice as seen in (Diagram, Fig. 5). This angle is found to vary more or less according to the dictation of ploughmen. A transverse section of this furrow slice (termed the trapezoid or crested furrow slice) will also be seen in (Diagram, Fig. 6).

In this system of ploughing the great object seems to be that of raising a furrow slice, that shall present a high shoulder as it has been called.

The general impression that prevails as to the advantages of this mode of ploughing are that the crested furrow affords a greater surface to the action of the atmosphere, and a greater quantity of cover to the seed, in case of a seed furrow in lea (sod).

As there appears to be some false reasoning on the point we shall venture a few remarks in the hope of leading others to a more full consideration of the points involved in the subject by comparing the two different furrow slices with each other.

We will first take the right angled furrow slice, 7 inches deep and 10 inches in width. The transverse section of this slice contains an area of 70 square inches, and to find the area of the triangle J D K (Diagram, Fig. 5) multiply the perpendicular D N by half the base, J K; D N being 5 nches, J K being 10 inches, (being in all cases equal to the breadth you are cutting) which will give an area of 25 square inches above the surface or base line. The triangle, J D K, from J to D is 7 inches and from D to K is also 7 inches giving an atmospheric surface of 14 inches.

In the next place we will take the crested furrow slice (as we will hereafter term it) at the same depth as the right angled slice which is 7 inches upon the land side in this case; but as the feather rises as it recedes from the point towards the furrow side of the slice, this edge of the slice will be but 5 inches and four-tenths in depth which will give an average depth of 6 inches and two-tenths in giving the same atmospheric surface to this slice as to that of the right angled slice. In the triangle, T W V, (crested furrow, Diagram, Fig. 6), the base, T V, is but 9 inches, which will give the breadth of

this slice. Now, as 6 inches and two-tenths is the average depth, and 9 inches the width of the slice, by multiplying the one into the other we have 55 square inches and eight-tenths of area in the transverse section of this slice, and by subtracting the area of one slice from that of the other, it will be found that the right angle slice contains 14 square inches and two-tenths more than that of the crested furrow slice. By contracting the base in this triangle to 9 inches, T W V, (Diagram, Fig. 6), the point W is elevated from the surface or base line four-tenths of an inch more than that of D in the right angled triangle furrow slice, yet we must compare the two triangles to give each their due merit. In this triangle, T. W. V., the atmospheric surface is the same as the right angled furrow slice 14 inches; the perpendicular W U being 5 inches four-tenths, the base being 9 inches as stated above, and multiplying the perpendicular by one half the base, as previously done, will give an area of 24 square inches three-tenths, leaving seven-tenths of an inch in favour of the right angled furrow slice.

As we have compared but a single furrow slice of each—each with the other; we will now, in order to carry the comparison more extendedly, take a ridge of land 15 feet in width, it will take 18 of the right angled furrows to plough this ridge, while it will require 20 of the crested furrow slices to do the same work. The atmospheric surface of the 18 right angled furrow slices would be 252 inches, while that of the crested furrows (20 in number) would be 280 inches, giving 28 inches of atmospheric surface in favour of the crested furrow slices. And the area of the 18 triangles of the right angled furrow slices would be 450 square inches, while the area in the triangle of the 20 crested slices would be 486 square inches; again, giving in favour of the crested slices 36 square inches; and lastly, comparing these number of furrow slices, the 18 right angled slices contain an area of 1260 square inches, while that of the 20 crested slices contains but 1116 square inches, giving in favour of the right angled furrow slices 144 square inches of more earth raised than those of the crested furrows. Another point remains to be noticed in reference to the two forms of slice.

We have seen that the rectangular slice necessarily requires that the bottom of the furrow shall be cut from the subsoil in a horizontal or parallel direction to that of the land surface, while the slice that is cut by the cresting plough leaves the bottom or subsoil of each furrow with a sloping rise from the

land side toward the furrow side (as seen in Diagram, Fig. 6), and this rise may range from one to two inches; but, as I have laid it to one inch and six-tenths, leaving an average of eight-tenths of an inch adhering to the subsoil, except so far as that adhering ridge may be rubbed down by the abrading action of the lower edge of the mould board, in which case, the ploughman has to bear very firmly upon the right handle of the plough, thus giving a greater draught for the horses than otherwise would be. This last process of rubbing down the subsoil with the heel of the mould board may be seen when the plough is working in tough or lea land; and to avoid this rubbing of the heel of the mould board it should be raised or chipped off with a chisel until the plough, when set upon a plane or board, the feather of the share would have a leaning upon the plane or board as well as the heel of the mould board.

With a cresting plough the spaces beneath the furrow will be seen more or less filled up with the crumbled soil, while with the rectangular plough the corresponding spaces will be left nearly void. Whether or not the filling in of these void spaces would be more beneficial than if this avaraged eight-tenths of an inch more left below should be turned up, covering the whole breadth of the slice with that thickness, I shall leave to others to decide. But it is more frequently left adhering to the subsoil, than it is to be rubbed off and stuffed under the edge of the slice. Under any view of the sudject, the system of the crested furrow ploughing is not unworthy the consideration of the farmer. In further considering the question, there are two points deserving attention. 1st. The effect upon the labour of men and horses. All ploughs adapted to cutting a crested furrow slice, are heavier in draught than when they cut the rectangular furrow slice. This will be naturally inferred from the manner in which they work; 1st. the position in which the hinge of the furrow lies in, it being one inch and six-tenths above the horizontal. The furrow having to roll, as it were, up an inclined plane; 2nd. the narrow feather of the share leaving more resistance to the plough's body in raising and turning the slice; and lastly, but not least, the small ridge left adhering to the bottom or subsoil, if rubbed down and stuffed under the edge of the slice, is performed by an unnecessary waste of power, seeing that the mould board is not adapted for removing such adhering obstructions. The second point to be considered is the loss of time and labour in ploughing the crested furrow of the width of 9 inches, compared with that of the right angled slice of the breadth of 10 inches.

The distance travelled to plough an imperial acre may be ascertained as follows:—The number of feet in the acre is 43,560. In ploughing a 10 inch furrow, 2 inches of the foot are left unploughed, therefore, for every five feet in the acre add one, which will give 52,272 feet, or nine miles and nine-tenths of a mile to travel in ploughing an acre, leaving out of view the time and labor expended in closings, turnings, &c.

Or thus, by taking a ridge as previously referred to of 15 feet in width by 2904 feet in length. It requires 9 boots or 18 furrows of 10 inches in breadth to plough this ridge, while it will require 20 of the crested furrows 9 inches in breadth to do the same, causing the man and horses to travel 58,080 feet or 11 miles, which gives one mile and a tenth in favour of the right angled furrow.

A passing remark may here appropriately be made on the subject of ploughing matches. That useful institution, by the emulation excited, has produced great excellence in the vocation of ploughing, yet, however good and beneficial these competitions are calculated to be the best desires of both the promoters and actors may be disappointed, or frustrated by allowing a false taste to prevail in these operations. That such a false taste is engendered there is but little doubt, and the result of it deserves but little encouragement. We mean a predilection for the high crested system. The palm is generally awarded to that kind of ploughmanship which exhibits the highest surface finish, without reference at all to the ground work of it. We would not by these remarks throw any discredit upon the ploughing matches; but we consider it to be important for agriculturalists to consider these suggestions, and to ascertain whether it is more to his interest that his ploughing should be essentially well done, and with the least expenditure of power and time, or that it should be done more to please the eye with a high surface finish, connected, perhaps, with a greater expense of power and time, and a less degree of perfection in the intrinsic merit of the work done.

Beholding a plough at work, the observer might imagine that the laying over of a furrow slice is a very simple process, but it is not so simple as it may appear to be. We have already shown in the construction of the plough, that the furrow slice is laid over by a machine of complicated structure, though simple in its mechanical action on the soil. Scientific skill is called forth in the plough's whole construction, which skill, is not certainly the least displayed in the geometrical form and action of the mould board. Good ploughing is a

most important art, and excellence in the business is only to be attained by attentive practice. The forms or modes of ploughing are of various kinds, and have received corresponding names, such as, gathering up, crown and furrow ploughing, casting, or yoking, or coupling ridges, cleaving down ridges, with or without gore furrows, ploughing two out and two in, ploughing in breaks, cross furrowing, angle ploughing, ribbing and drilling, and the preparative operation to all ploughing is termed feering or striking the ridges. These various modes of ploughing are contrived to suit the nature of the soil and the season of the year. Heavy land requires more cautious ploughing than light, because of its being more easily injured by rain; and greater caution is required to plough all sorts of land in winter than in summer. The precautions alluded to are in order to give facilities for surface water to flow away. Different seasons demand their respective kinds of ploughing, and some modes are common to all seasons and soils.

It is not intended in this little work to give an account of all the modes of ploughing, from the simplest to the most complicated, but to give the leading points, and therefore we shall now refer more particularly to the feering or striking out the ridges. Ploughers are too frequently seen to enter a field with horses and plough, and striking out a land or ridge, without a single range stake, or even an object on the opposite side of the field as a guide. Away they go across the field, leaving a zig-zag trail behind them, similar to the wake of a ship at sea, or more similar to the path of a drunkard, wending his way home from the grog shop.

We would now offer a few remarks upon the proper mode of feering or striking out the ridges. We will suppose the enclosure extending east and west, and north and south; and as ridges are usually made north and sodth in order that the growing crop may receive the benefit of the sun's rays, throughout the day. But on sloping ground where draining is not introduced, the ridges should lay in the direction of the slope of the land, so that the surface water may flow easily away. But for our present purpose, we will suppose the surface of the land to be flat. We will then take 3 or more poles 7½ feet in length, or longer, if sharpened at one end. This 7½ feet being one-half the breadth of the ridge, the poles should be marked at 3 feet 9 inches from each end, which will give one-quarter of the breadth of a ridge. We then measure with these poles, 15 feet along the north or south side of the field, as the case may require, for a headland. We next proceed to

erect these poles as guides by which to direct the horses, having one standing at the extreme side of the field, opposite to that end of the field from which we start; the second should stand three-quarters of the distance across the field, while the third should stand nearly in the centre. In this case you will require the fourth to measure off the starting point. Next see that these poles all range, and if they do not, make the necessary removals of any of them that may be out of range, so as to produce a neat and true alignment. Then getting exactly on this range, start the plough, in all cases throwing the furrow slice towards the fence or outside of the field. The same process should be done on the opposite side of the field, leaving a headland upon both sides of the field, as well as to denote the beginnings and endings of the furrows.

Ridges are made of the different breadths of 10, 12, 15, 16, and 18 feet. These various breadths are ruled partly by the nature of the soil, and partly by local custom. It must be understood, that we have chosen a ridge 15 feet in width, as the subject of our remarks. We have feered only the two headlands. We will now commence feering out the ridges. Consider first the space you wish to leave between the fence and ploughed ground, and from that space we measure 3 feet 9 inches, and plant a pole. Then again at one-fourth the distance across the field, we measure 3 feet and 9 inches as before, and plant the second pole. Then again about the centre, measuring the same distance, we plant the third pole, and then again at the starting in of the plough. Then see that your poles are all truly aligned, making corrections, if necessary; and before starting the plough, measure off 1¼ ridge, namely 18 feet 9 inches from our first feering, and plant a pole. We then start with the plough to the first pole, where we stop with the pole standing between the horses' heads, or pushed over by the tyings between the horses. We then with this pole, measure off from this pole, at right angles, the same width as at the starting in of the plough, namely, 18 feet 9 inches, and plant this pole. We then proceed with the plough to the next pole, and again measure off the 18 feet 9 inches as before, and plant this pole; and again, as we come to the last pole, standing at the headland, we again measure off the same distance as before, and plant this pole; and at the same time see that our poles are neatly and truly aligned. The above process, we follow up with each feering, throughout the field. It is of much importance to the correct feering of the whole field, to have these first two feerings drawn correctly, as it is

obvious, that an error committed at the first feering, will extend its ill effects throughout the whole field. The half ridge is ploughed in a different manner from the rest. It is ploughed by going round the feerings, until we have ploughed the 3 feet 9 inches between the feerings and the fence. The advantage of ploughing this half-ridge is, that the open furrows are thereby left an equal distance apart.

Few persons take the trouble of going into such accuracy as above described, in feering, but a very careful ploughman considers it absolutely necessary to use all the above precautionary means, and every proficient farmer will always use them; not regarding the sacrifice of the required time and labour, as he is amply repaid by the accuracy and utility of the work thus produced.

In this treatise it might not be considered excusable were we to omit to make a few rkmarks upon the subject of wheels and their effects upon the draught of ploughs. First then we will suppose a plough to be yoked so as to swim evenly, that is, not having a tendency to run too shallow or too deeply; not tending to take too wide or too narrow a furrow slice, but running free and easy, cutting the width and depth of the furrow slice previously determined upon. To attach wheels to a plough thus adjusted, would only be loading it with unnecessary weight. The wheel in this case, could render no assistance. In order that the wheel should produce an effect upon the plough, the point of the beam or draft hook must be raised above the line of draught, thus: the draught being more horizontal, and the hook being above the original or direct line of draught from the centre of resistance on the plough's body, to that point on the horse's collar where the draught chains are attached. Hence the conclusion drawn, is that wheels placed under the beam can never lessen the draught of the plough; but on the contrary, it must in all cases increase the draught more or less, according to the distance the hook is from the direct line of draught. And in case of two wheels, (the one to guage the depth of furrow slice, the other, the width,) the draught will increase proportionally two-fold. As the plough must be yoked so as to be seeking both depth and width, the wheels will then both bear and exert their efforts by a reaction, to counteract the tendency of the plough, on the one hand from sinking deeper in the earth than the required thickness of furrow slice, and on the other, from cutting a broader slice than required; and these antagonistic forces will be in constant operation to a greater or less degree. The

friction will be increased by these effects, in proportion to the amount of bias which has been given to the plough. Hence the conclusion is strengthened, that in all cases wheels are incumbrances, and sources of increased draught to the plough.

That wheels may be of advantage for the working of the plough in the hands of the unskilful ploughmen, may be true. Whatever blindness may prevail in reference to wheels, it must be admitted, even by the advocates of the wheel plough, that though they will work with regularity in ploughing level lea, whether the holder be an experienced phoughmen or not, that in cross ploughing they cannot by any means be brought to follow the unevenness of the surface; the wheel leaving one ridge and rising another, the share will pass too shallow, and in passing over the brow of the next it will go too deep, or at least deeper than the average depth of the ploughing. The same may be said of all other uneven surfaces. No ploughman who is able to use the swing plough will ever suffer himself to be incommoded with the addition of wheels to his plough, and this he does, not from a conviction that wheels increase the labour of his horses, but that they are a source of annoyance to himself. It may be further remarked as regards wheel ploughs, that since the wheels must always have a tendency to increase the draught, and on that account are objectionable. If a plough can be handled with equal, and perhaps better effect without wheels than with them, the excuse that a wheel plough may be wielded by a man of inferior qualifications is of small value. Any man may be trained to handle a plough, though every man will not be equally successful. If ploughing can thus be performed with an implement of the simplest form, and in a satisfactory and economical manner, there can be no necessity for using a more complicated and expensive machine to perform the same amount of work, when that work will be no better done, or done with less expense.

We proceed to introduce once more the subject in regard to the plough to which we would call particular attention, and that is the wooding or frame work of the plough. We will first direct the readers attention to the beam, which, as stated before, is bolted to the land side with two firm bolts, one end projecting backwards till it merges into the left or beam handle, whilst the other end projects forward until it comes nearly to the line with the centre or point of resistance on the plough's body, to that point upon the horses collar to which the draught chains are attached; thus with these ploughs the point of the beam projects forward of the point of the

share from 13 to 16 inches. The height from the base or floor is from 14 to 15 inches. These points may be altered, providing the alteration is continued backward or forward in a certain angle. In some instances, such as very hard clay soils and a heavy team, these points might range too low, and in this case we should raise the beam by placing a bit of leather between it and the casting of the land side. In reference to the point of the beam ranging with the plane of the land side, the practice of different makes, makes that range from 1 to 2 inches. It is the opinion of some writers and practical men that the land side of the beam should be parallel with the land side plane of the plough's body. With all deference to such opinions, we apprehend that the direction of the line of draught in a vertical plane cannot coincide with the plane of the land side, for the point of resistance in the plough's body cannot fall in that plane but will pass through some point to the right of it. Viewing the nature and reason of the subject we will take for example the wedge (as the plough when drawn in the earth acts upon the same principle as that of the wedge), and attach the draught in the line of one of its planes. We shall find by drawing it that the weight all being on one side of the line of draught that it will endeavour to find its equilibrium. If we attach the draught to the point of the wedge, and then draw it, we shall find the point leading the centre of the heel or head of the wedge. Both reason and experience point this out to the ploughmakers, and more particularly to the observing and at tentive ploughman as his phough is being drawn along the earth's surface.

We shall therefore adopt the instructions laid down by Small, and in which we are sustained by practice, for the formation of the beam (which in Small's time was made of wood), that the land side point of the beam should lie in the line of the land side of the plough's body, and as he directed the beam to be $2\frac{1}{4}$ inch in breadth at that point; its axis must have been $1\frac{1}{8}$ inch to the right of the land side plane; and in all cases it must be admitted that the resultant of the effects will be in the axis of the point, provided the draught bolt or hook is placed in that line. But for very sufficient practical reasons the draught hook has a range from right to left, by which the effects of variations at soil and other causes it can be rectified and adjusted at pleasure.

A similar difference of opinion also exists in regard to the position or beam handle in reference to the land side plane. One person wishes his beam and handle in one straight line,

and that running parallel with the plane of the land side. Another person requires it 2 inches to the left; and a third will require *his* set over 7 inches to the left of the land side plane; and this deviation has been advocated on the principle of allowing the ploughman to walk midway between the handles of the plough, his arms been equally extended. Now, whether it is easier to the man who walks with his arms equally extended, and his body equally distant from each handle, or he who is compelled to have one handle always near his body, whereby he can on any emergency bring his body instantaneously in contact with the hand or that which it grasps. Which of those men will have the greatest command over the implement he guides? It will require but little consideration to satisfy any enquiring mind that the latter must be a decided advantage. We would not, however, recommend this position as a general rule; for the ploughman in general would lean the plough over until his arms were equally extended, and by consequence cause the plough to cut a furrow slice of an unequal depth.

The position of the handles comes lastly under notice. Their length is from 6 to 7 feet; they project backwards and upwards, as stated before, acting as levers to guide the plough; their height is altogether a matter of convenience. But they would be better low than high; being low the plough is more under the controul of the ploughman, but as a general rule from 2 feet 8 inches, to 2 feet 10 inches would be an ordinary proper height.

In reference to the irons we would add yet another remark. If the cutting edge of the coulter and the point of the sock were laid with steel, the iron will cut clean, and go long in smooth soils; but in gravelly and all sharp soils the irons wear down so quickly that farmers prefer iron and have them sharpened every day rather than incur the expense of laying them with steel, which, perhaps would not endure work much longer in such soil than iron in its ordinay state. Irons are now seldom, if ever steeled; but whether steeled or not they are always in the best state when sharp and of proper length.

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TESTIMONIALS.

Among the many approbatory notices and recommendations which have been given of Bingham's newly patented plough, we select the following:—

TRIAL OF PLOUGHS AT PARIS, CANADA WEST.

	Draught.	Depth.	Width.
Mr. Robert Cairns, Paris.....	3½ cwt.	6½	9
Mr. Barrowman, (imported).....	4¾ "	6½	9
Mr. Morley, plough.....	3⅛ "	6½	9
Mr. Wilkie, (imported)	3½ "	6	9
Mr. Peter Willson (iron plough) Paris	4¼ "	6½	9
Mr. Bingham, Norwich	3 "	6	11

I certify that the above is a true statement of the draught of the several ploughs at the annual competition of the Paris ploughing match, in the fall of 1854, as far as could be ascertained. The trial having been made by one of the most approved Dynamometers, newly imported from Edinburgh, Scotland.

(Signed,) JOHN TENNANT.

Copy Letter from Russel Smith, Esq., Township of Burford.

Jacob Bingham, Esq. Burford, October 1st, 1855.

Sir,—My man has just finished ploughing a small field with your newly invented plough, and I must say, I never saw better work done by any plough. The draught is as light as any other plough of its size, although it is not yet thoroughly polished. Yours,

(Signed,) RUSSEL SMITH.

Copy Letter from Mr. James Bailey, Township of Norwich.

Mr. J. Bingham. Norwich, September 10th, 1855.

Dear Sir,—I am highly please with the trial of one of your largest sized ploughs, and would not part with it on any consideration whatever, provided I could not obtain another. I must say to the public, what I have frequently told you, that is, I have tried about all the

leading ploughs that have come under my notice, in order to get one that my son could manage (he being a lad of 14 years, and small of his age.) I hear no more complaint from him since getting this plough, but it appears rather a pleasure for him to use it than otherwise; in fact I have seen him let it go frequently without holding, while it was cutting its regular furrow, which on an average is 9 inches deep, aud from 12 to 14 inches in breadth, and that with a span of 4 year-old colts. And I must further say, that it is the best swing plough I ever put my hands to, either in this, or the old country (being an Englishman). In fact it is above all praise, and I can assure the public, all that is required of them is but to purchase and satisfy themselves; they surely will not be disappointed.

A well wisher to the public, and yours with great respect,

(Signed,) JAMES BAILEY.

Copy Letter from Mr. Robert Scott, Township of Norwich.

Jacob Bingham, Esq. Norwich, January 21, 1856.

Dear Sir,—I bought from you one of your newly patented ploughs last harvest. My son has turned over about 20 acres of stiff sod with it, and I must say in justice to you, and to the benefit of the country, it is the best kind of plough I know of.

Yours, with respect,

(Signed,) ROBERT SCOTT.

Copy Letter from W. E. Nesbit, Esq., Township of Dereham.

Mr. Bingham. Dereham, January 11th. 1856.

Sir,—I have the pleasure to inform you, that the plough I purchased from you on trial, has proved good beyond my most sanguine expectations. The best I ever had in this country, or in fact in any other. I can confidently recommend it to any ploughman, wishing to do his work according to rule. Wishing you the success you deserve, for your valuable improvement.

I am your obedient servant,

(Signed,) W. E. NESBIT.

Copy Letter from Mr. William Horning, Norwich.

Mr. Bingham. Norwich, January 17th, 1856.

Sir,—In answer to your request for my opinion of your plough, I

have the satisfaction to inform you, that I can recommend it to be the easiest plough both for man and beast I ever held, and in regard to width and depth, I can plough from 4 to 12 inches in depth, and from 7 to 16 or thereabouts in breadth; and I have never regretted that I suffered myself to be pursuaded by you to take the plough and give it a fair trial. Yours, &c.

(Signed,) WILLIAM HORNING.

Certificate from Mr. Thomas Gray, Norwich.

Norwichville, January 19, 1856.

This may certify, that I have had in my possession, one of Bingham's Patent Screw Clevis Ploughs for three years past, and must say that it is the best and most durable article of the kind, that I ever had. Since furnishing myself with this, I have used no other. I have ploughed 80 to 100 acres with it every season, and from the little wear and tear it has sustained, I am quite confident that it will outwear myself, although hardly past the meridian of life; and I will further say, as there is no bolts, small clevis, rings or keys, to be hunted up preparatory to the starting the plough, there is, consesequently, no time lost. I can therefore recommend it to the public, as the cheapest, most perfect, and most durable article, that has ever come under the name of plough.

(Signed,) THOMAS GRAY.

Copy Letter from Mr. Sylvester Harris, Township of Norwich.

Jacob Bingham.

I have used one of your large patent ploughs, and consider it very light in draught, and capable of doing as good work as any plough in use, and as such, can cheerfully recommend it.

Yours, with respect,

(Signed,) SYLVESTER HARRIS.

Mr. Bingham has shown me a model and illustrative drawings of his Patent Plough, which appears to possess the most recent im-

provements that have been effected in that important implement. The bridle or clevis is quite novel and highly ingenious. I am disposed to regard this Plough as having no ordinary merit, that is judging of it without seeing it in actual operation; and it appears to be well deserving of a fair trial from such as desire to have an effective implement of apparently light draught.

GEO. BUCKLAND,
Professor of Agriculture.

University College, Toronto,
Feb. 15, 1856.

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NORWICH FURNACE.

THE Undersigned having lately purchased from J. Bingham his entire interest in the above named establishment, is prepared to furnish at short notice, STATIONARY ENGINES. MILL GEARING of every description executed promptly and thoroughly. And also, is prepared to furnish at wholesale or retail the following articles, viz : Stoves, Ploughs, Field and Corn Cultivators, Harrows, Horse and Hand Hay Rakes, Straw, Chaff, or Cornstock Cutters, of the most approved patterns, including Brown's Patent Road Scrapers, Farm and Railroad Barrows, Pipe Boxing, Boxing Cast in Sand or on Chills, Sleigh Shoes, Hand Irons, Sugar Kettles, &c., &c. The Stoves are of the following patterns, namely, the King, Burr (2 sizes), Clinton, Premium, Parlor, Cook, &c., &c. Parlor Stoves of different forms and sizes, Box and Plate Stoves weighing from one hundred to eight hundred pounds. The Ploughs are from the earliest to the latest, and most highly approved patterns, of different makers, such as Bingham's Patent, Thirkles Patent, (imported), the Lanarkshire or Wilkie Plough, the Mid-Lothian or Currie Plough, and Grey's Board, Scotch Canadian, Premium, &c., &c.; Corn and Gang Ploughs.

Every description of Blacksmith work done with neatness and despatch. The subscriber is prepared to receive orders of every description in this line of business, which will be executed on the shortest possible notice, and warranted of the best material. In thus soliciting support to the above-named establishment, he has only to say, that, the principles which has guided him heretofore may be simply applied in the following, viz., punctuality, integrity, and a first-rate article at a moderate price: and such shall be his continued aim ; and by having in the establishment some of the best mechanics that is to be found in the country, he hopes by strict attention to the execution of orders, good workmanship, and by using the best materials, and in fact everything to make the establishment worthy of the support of the public at large. And he would further say, to those wishing any of the above-named articles, or casting, will find it to their interest to give him a call before purchasing elsewhere.

JAMES BARR.

Norwichville, January 1st, 1856.

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Bingham, Jacob
A practical essay on the plough
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